

MISSOURI resources

Fall 2001 • Volume 18 • Number 3

table of contents

Missouri Department of Natural Resources

Director's Comment

The White River Basin Sharing the Resource Means Sharing the Protection

by Diana Sheridan

The economic well-being and quality of life in the White River Basin is inextricably linked with its water quality.

The Four Rs of Reeds Spring High School

by Philip Tremblay

Students, stirred to action by the threat of a regional composting center in proximity to their school, demonstrate how to recycle, reduce, reuse and respect.

Battling the Big Chill Weatherization Program Celebrates 25th Year

by Kerry Cordray

Since its inception, an assistance program for homeowners has evolved from plastic sheets on windows to computerized energy audits.

16 • News Briefs

Resource Honor Roll, Letters, E-Notes, Time Exposures

20 • Resources to Explore

Iliniwek Village State Historic Site

23 • Teacher's Notebook

Leopold, the Landscape and Learning

25 • One Last Word

A Ranger's Shift – No Walk in the Park



Above right: Reeds Spring High School science teacher Mike Collins welcomes visitors to the school's composting center.
Above: A doe and her two fawns wade through the water in the Missouri River bottoms in Boone County.

DNR photos by Scott Myers



MISSOURI

resources



Front Cover: The population boom in the southern Ozarks means increasing demands on area rivers and lakes, like Lake Taneycomo.

Back Cover: Table Rock Lake's dam is reflected in the lake's clear waters. Continued efforts aim to preserve that water clarity.

Cover photos by Scott Myers



Director's Comment



For the past few months, I have been working with my staff on improving our agency to maximize our performance. The Department of Natural Resources was one of four state agencies selected by Gov. Bob Holden to take a closer look at providing more service, more efficiently, while still reaching our goals.

Improving the department's organization will allow us to be more effective, efficient and coordinated in serving the citizens of Missouri. I want to change how we do business, and I want to improve our structure. By helping Missourians comply with regulations, prevent pollution, find financial assistance, and by acting in partnership, we can better protect and improve our natural, cultural and energy resources.

There are four basic changes that will take place. First, we will establish an Outreach and Assistance Center to integrate services that directly assist citizens, businesses and communities. The center will include our Environmental Assistance Office, the Energy Center, the Historic Preservation Program, an outlet to the various financial opportunities available through the department, our Urban Outreach Offices in St. Louis and in Kansas City and our Public Information Program in Jefferson City. We will gather input from people we work with on how to improve our external and internal communications and on how we can deal with complex environmental issues more efficiently and effectively.

Second, improvement and protection of Missouri's water quality will remain one of my top priorities. The number and importance of water-related issues will continue to grow in Missouri. To address this we are splitting the Division of Environmental Quality into two divisions: a Water Quality and Soil Conservation Division and an Air and Land Resources Division. The water division will house our water pollution control, drinking water and soil conservation efforts and our regional offices. The air and land division will house our air pollution control, solid and hazardous waste programs, land reclamation efforts and our laboratory.

Third, we're renaming the Geological Survey and Resource Assessment Division to the Geological Survey and Resource Assessment Division. This

will reflect the division's scientific and resource responsibilities and emphasize its role in the assessment of our environment.

Finally, we want to create a departmental field presence rather than the traditional single division presence. So, our regional offices will better reflect the services of our entire department. We have tested this in several of our regional offices and in the St. Louis Urban Outreach Office. I want to expand this successful concept.

There are many benefits we're hoping to achieve with our organizational improvement. Integrating our programs, policies and priorities to focus on providing assistance to citizens, businesses and communities will greatly enhance our effectiveness. I want to eliminate outdated procedures or structure to focus on improving Missouri's environmental health.

If there are ways we can serve you better, please let us know by calling 1-800-334-6946 or by e-mailing us at [nrpattc@mail.state.mo.us]. I look forward to hearing from you.

Steve Mahfood,
Missouri Department of Natural Resources



Light Housekeeping

Fluorescent lamps provide a long-lasting and energy-efficient alternative to incandescent lightbulbs. However, some fluorescent lamps contain metals, such as mercury, cadmium and lead that can be toxic to people, animals and the environment if the bulbs are broken.

When shattered, fluorescent bulbs can expose people to dangerous levels of mercury vapor and other metals.

Although recycling used fluorescent lamps through a certified facility is the preferred method of disposal, those with only one or two waste bulbs on an infrequent basis can place them in the trash for disposal in one of Missouri's sanitary landfills.

- To limit breakage and potential mercury inhalation, place old lamps into the replacement lamps' boxes for transport. Put the boxes in plastic bags and secure the bags at the top. If no box is available, use a heavy plastic bag secured at the top.
- Never crush or incinerate fluorescent lamps. Inhaling the mercury is harmful.
- When replacing lamps, consider purchasing brands with lower, nonhazardous levels of heavy metals.
- To reduce the amount of mercury that is put in landfills, contact lamp manufacturers to encourage them to produce lamps with lower, nonhazardous mercury levels and ask if they have a recycling program you can use.





For more information, contact the
Missouri Department of Natural
Resources' Hazardous Waste Program at 1-800-361-4827 or
access our Web site at [www.dnr.state.mo.us/oac/pubs.htm].



Letters

I just want to say, I enjoy receiving *Missouri Resources* and reading the very informative articles. Our money seems to be well spent in this endeavor. Keep up the good work.

*John Borra
Blue Springs*

I cannot tell you how happy I was to see your article on [methamphetamine labs](#) that appeared in the spring issue of *Missouri Resources*. The article was very well written and exposed the ever-present dangers associated with such activity. Much praise should go to author Brad Harris and photographer Scott Myers. Unfortunately, the existence of these labs in the Ozarks is no secret outside the state of Missouri. I am a photographer and have friends from other states who have expressed both a desire and a fear of photographing in the Ozarks. Photographers like to get off the beaten path. Unfortunately, there are areas of the Ozarks where this would not be recommended.

Several years ago, before I knew of the existence of these labs and related activity associated with them, I accidentally crossed the path of some rather unsavory people while looking for an old mill to photograph. I managed to get out alive, possibly because of my dogs or perhaps they were feeling in a benevolent mood and decided I hadn't seen or heard anything.

Thank you again for an excellent article. I applaud all efforts by law enforcement to remove these labs and in doing so, make the Ozarks not only a safe place for a family vacation, but for the photographer who likes to get off the beaten path.

*Jeanne Morton
St. Louis*

To celebrate our 15th wedding anniversary, we decided to ride the [Katy](#)

[Trail](#) 175 miles from Sedalia to Augusta. "Are you nuts?" our friends asked. Well, we did it. Were there times we wondered what we had done? Absolutely! Would we do it again? You bet!

We (along with our bikes) hopped on Amtrak at the Kirkwood station and enjoyed the beautiful ride to Sedalia. The trip back across state took a bit longer, as you can imagine. From Sedalia it was off through Pilot Grove, Boonville and a wonderful night at a bed-and-breakfast in Rocheport.

The next morning, we started our longest day, and rode 68 miles on what many consider to be the most beautiful part of the Katy Trail. We had lunch in Hartsburg, traveled past the state capital and on to Bluffton, where we spent our second night in a bed-and-breakfast that had been constructed from a sunken steamboat pulled from the Missouri River.

Our final day, we rode through Treloar, Marthasville, and Dutzow, before arriving at Augusta. Many of the bike riders we met were from other states and had come to Missouri just to ride the Katy Trail. We also saw wildlife galore.

Thanks to DNR, the trail was in superb shape the entire distance, in spite of several weeks of heavy rain. If you like the outdoors and don't mind a sore butt, we recommend this trip highly.

Beth and Dudley McCarter
St. Louis

I look forward to reading "Resources" and have learned many things and discovered many beautiful places in this great state.

Joan Mangogna Finnegan
St. Louis

Letters intended for publication should be addressed to "Letters," *Missouri Resources*, P.O. Box 176, Jefferson City, MO 65102-0176 or faxed to (573) 751-7749, attention: "Letters." Please include your name, address and daytime phone number. Space may require us to edit your letter. You also can e-mail *Missouri Resources* staff at moresdnr@mail.dnr.state.mo.us



News Briefs

Missouri River Cleanup is Oct. 6



Approximately 200 volunteers are expected to help clean up the Missouri River on Oct. 6. The Missouri Department of Natural Resources will co-sponsor the event, along with the Missouri River Communities Network and the Missouri Department of Conservation. Teams of volunteers will clean up a 30-mile stretch of the river between Hartsburg and Rocheport. Participants will be able to take advantage of the Missouri River Environmental Expo.

This will be one of 17 community cleanups organized this year by Moline, Ill.-area native Chad Pregracke, who has led several river cleanup efforts. Pregracke and his crew were given a Resource Honor Roll award by *Missouri Resources* in its Winter 1998-99 issue and have received national media coverage of their work.

If you would like to participate in the cleanup or sponsor an information booth at the expo, contact the Missouri River Communities Network at (573) 256-2602.

EPA Approves Clean Air Plans

The U.S. Environmental Protection Agency (EPA) has approved Missouri and Illinois clean air plans for the St. Louis area. In addition, EPA is extending the ozone (smog) attainment date to Nov. 15, 2004. EPA determined that plans submitted by Missouri and Illinois demonstrate that the St. Louis area will attain the national ambient air quality standard by 2004.

This means that Clean Air Act provisions for additional local control measures beyond those currently in place in the St. Louis area will not be triggered at this time.

Both states have implemented a host of local pollution control measures

to reduce smog levels. Key components of Missouri's clean air plan include the Gateway Clean Air Program, reformulated gasoline, industrial regulations and a regulation that controls pollution from electric utility boilers throughout the state. The extension will allow the area to continue implementing these important control measures.

For more information, call the Department of Natural Resources' [Air Pollution Control Program](#) at 1-800-361-4827 or (573) 751-4817.

Solar Water Pumps For Cattle



The Missouri Department of Natural Resources' Environmental Assistance Office (EAO) is offering Missouri farmers and ranchers the opportunity to develop an Intensive Grazing System using solar-powered water pumps at minimum cost. EAO has applied for a federal grant that would be used to provide a solar panel, pump, tank, platforms, piping and valves to a farmer. The farmer would provide water sources, miscellaneous system components and grazing paddocks.

Solar-powered water pumps combined with Intensive Grazing Systems have been successfully demonstrated and the department proposes using them on a broader scale.

Most Missouri cattle operations use conventional selective grazing with streams and ponds as water sources. Cattle have free access to the streams and ponds, which can increase bank erosion and pollution. Intensive Grazing uses fenced paddocks to increase forage production, efficiency and profits.

Recipients must host at least one field day to demonstrate the project and provide cost and benefit data to interested groups.

For more information, contact [EAO](#) at 1-800-361-4827 or (573) 526-6627.

Solar Cars Spin Through State

The past and the future converged this summer as 28 solar-powered cars raced down historic Route 66 during the first-ever American Solar Challenge. The 2,300-mile race, supported in part by a \$5,000 grant from the Department of Natural Resources' Energy Center, is the world's longest solar car race.

The teams, including 26 college teams, one professional association and one high-school group, began their journey at Chicago's Museum of

Science and Industry on July 15. The cars passed through 14 checkpoints in seven states before crossing the finish line in Claremont, Calif. on July 25.

The University of Missouri-Rolla car, Solar Miner III, led the pack into Rolla for one of two overnight stops. Department of Natural Resources staff assisted at the Rolla checkpoint and also provided a booth with activities and information.

The Solar Miner III also received a \$5,000 grant from the [Energy Center](#). The car led for much of the race but eventually finished second behind the University of Michigan. The University of Missouri-Columbia SunTiger IV finished 11th.

Soybeans to Power Bi-State Buses



The Bi-State Development Agency is cleaning up the air in St. Louis while giving Missouri's soybean economy a boost. This summer, Bi-State announced plans to replace the traditional diesel fuel in its vehicles with biodiesel. Biodiesel, a domestically produced fuel made from soybean oil, lowers emissions including carbon monoxide, unburned hydrocarbons and particulate matter.

"Biodiesel has been good for the environment and also represents a partnership with soybean farmers in rural Missouri," said Bi-State spokeswoman Linda Hancock-Ross.

Bi-State is a member of the St. Louis Clean Cities Coalition, a grassroots organization that brings together government and industry to promote the use of cleaner fuels. Anita Randolph, director of the department's Energy Center, praised Bi-State for its commitment to finding fuel alternatives.

"This is a positive decision that will reduce harmful emissions, benefit Missouri's agricultural industry and reduce dependence on fossil fuels," she said.

Bi-State Development operates 573 buses and 80 Call-A-Ride vans in the St. Louis metro area.

Workshop Receives Program Grant

The Reynolds County Sheltered Workshop in Bunker has received \$50,000 from the Missouri Market Development Program. The money was

used to buy equipment to expand the company's recovery of construction and demolition wood waste. The workshop makes products from wood waste, including craft and furniture items and storage buildings. Most of the wood waste is collected from the Peerless Landfill in St. Louis County. Bunker is located about 22 miles southeast of Salem.

[The Environmental Improvement and Energy Resources Authority \(EIERA\)](#) administers the Market Development Program. EIERA provides technical and financial assistance for energy and environmental projects.

Locust Creek Wins National Award

The Locust Creek Riparian Trail in [Pershing State Park](#) near Laclede has been recognized with a national award of achievement from the Coalition for Recreation Trails. The trail was recognized for outstanding use of federal Recreational Trails Program funds in the category of construction and design for 2001. The trail was one of only eight in the nation so recognized.

The six-mile hiking and backpacking trail connects Pershing State Park, operated by the Missouri Department of Natural Resources, to Fountain Grove Conservation Area, operated by the Missouri Department of Conservation. The first mile of the trail in the park is an accessible boardwalk with interpretive signs.

In addition to the interagency cooperation, the project was made possible because of a nonprofit conservation organization and local support. The Conservation Heritage Foundation received a grant through the federal Recreation Trails Program, which is administered by the department, to construct a suspension bridge. Meadville Boy Scouts completed much of the trail.

Banks Elected New EIERA Chairman

Charles Banks was recently elected chairman of the Environmental Improvement and Energy Resources Authority (EIERA). Banks is the Jefferson County coordinator for U.S. Rep. Richard Gephardt. He formerly served as EIERA treasurer.

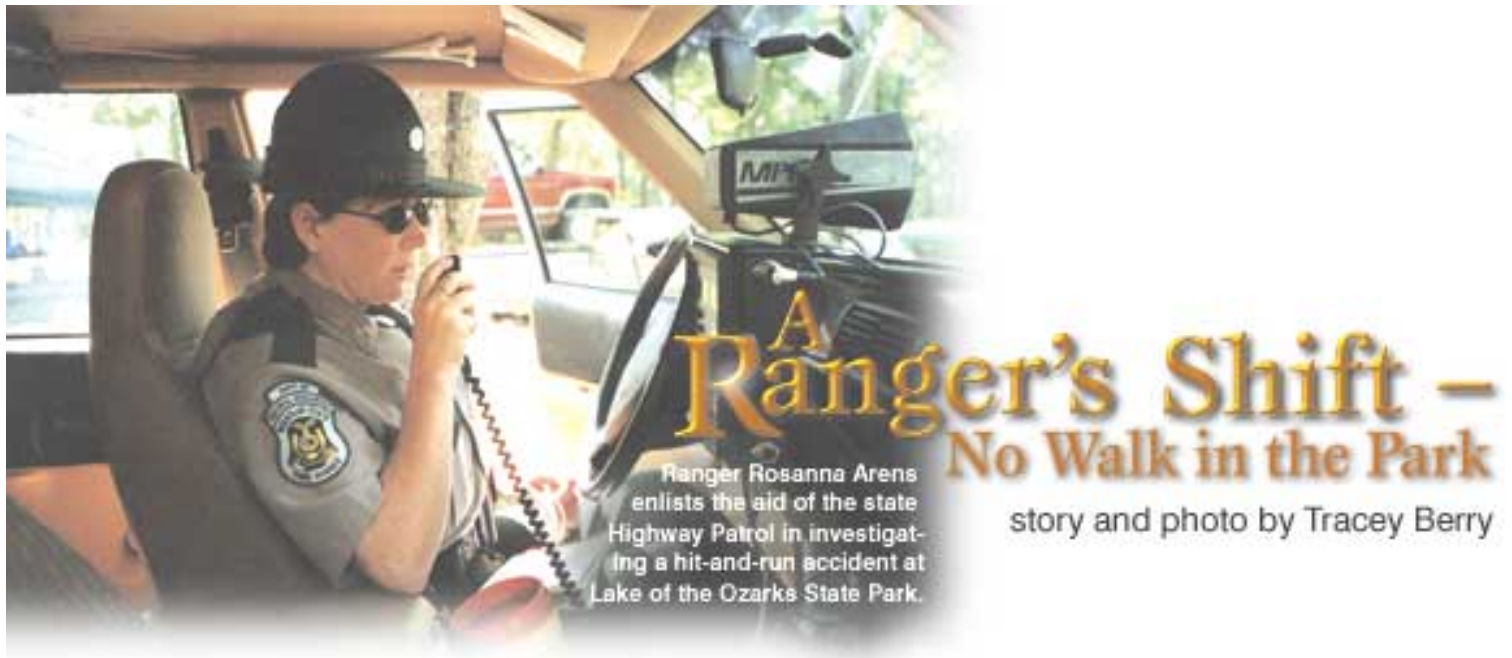
David Childers, a Springfield attorney with the law firm of Whiteaker & Wilson PC, was re-elected to the post of vice-chairman. Judy Hinrichs was elected treasurer and also serves as secretary. Hinrichs is the executive director of America's Music Center in St. Louis.

EIERA is the bond-issuing authority for the State Revolving Loan Programs and energy efficiency programs for the state of Missouri.

MISSOURI resources

Fall 2001 • Volume 18 • Number 3

One Last Word



The park ranger EAOs a tuning fork and lifts it to the antenna of a radar unit inside her Jeep Cherokee. Assured by the reverberations that the radar is working, she starts to maneuver the vehicle out of the lot. Spying a maintenance worker, she asks if he knows of any problems around the park, such as downed trees from the previous night's storm.

Ranger Rosanna Arens is beginning her 4 p.m.-to-midnight shift patrolling Missouri's largest and busiest state park. [Lake of the Ozarks State Park](#) comprises 17,000-plus rugged acres of wooded hills and shoreline.

"For anybody in law enforcement, if you like the outdoors, this is the job," Arens says. "It drives me crazy when I have to be in the office for any length of time. If I could, I'd bring a laptop in the Jeep and fill in my reports out here."

Her first stop is a campground. A camper has complained that someone backed a boat

trailer into her car and left the scene. However, a witness wrote down his license plate number and Arens radios the Highway Patrol for a license check.

Arens resumes her patrol. Most visitors receive a smile and a friendly wave. She sternly points a forefinger down at those motorists whom radar indicates are speeding. As she cruises through a parking area, a driver heads the wrong way down a one-way road. Donning her ranger hat, she approaches the man and explains the offense. A check with the Highway Patrol determines he has no outstanding warrants. She gives him a verbal warning and, noting the date on his license, wishes him a happy birthday.

"A lot of people think I'm with the Conservation Department because the uniforms are similar. I have to explain that I'm a police officer and my jurisdiction is in the park."

Arens worked as a sheriff's deputy before becoming a ranger. The biggest difference in her new assignment is she is summoned to far fewer domestic disturbances. But, marital spats still occur. On a recent call, she assisted a man stranded in a sinking boat who had no means of loading it onto his trailer after his irate wife drove away in their vehicle.

As Arens drives through the Pa He Tsi boat launch area a man rushes up to her vehicle. "Do you have a slim jim? I've locked my keys in my truck." She shakes her head "no," she can't help, just as his friend approaches, victoriously waving a coat hanger.

Now it's off to the Osage Beach law enforcement center to collect the license plate report on the hit-and-run driver. While there, Arens checks the status of a plane crash report by the Highway Patrol. Less than a week earlier, a private plane crashed in the park, killing three people on board. Arens helped scour the woods for the wreckage that was eventually found at the foot of a steep hill. The Highway Patrol and Federal Aviation Administration investigated the crash and removed the bodies via horseback because of the rugged terrain. As the resident law officer, Arens secured the scene and, among other duties, kept inquisitive reporters at bay.

As darkness falls, deer, seemingly unperturbed by passing cars, begin to appear alongside the road. Arens drives cautiously. She has developed a protective attitude toward the animals in the park and says it bothers her when the deer are injured or killed in collisions with vehicles.

She returns to the campground where she walks most nights, enjoying the exercise and the contact with guests. Regretfully, Arens reminds a family harmonizing around a campfire that it is now quiet hours and the singing and strumming must cease. As she moves quietly along the darkened road a stocky-looking terrier growls and follows her as she passes its campsite. "Your dog has to be on a leash," she reminds its owners. The previous night she used beef jerky to bribe an ill-tempered, yellow Labrador that threatened campers.

As she walks, she keeps an eye on some people night fishing along the lakeshore,

commenting that anglers who own property bordering the park and use park roads to reach their homes and favorite fishing holes keep her busy during the winter. "These people who live at these lakes are hard-core fishermen. It doesn't matter if it's cold or stormy, they'll be out fishing. It just amazes me."

An hour later she returns to her vehicle and prepares for the end of her shift. It's nearly midnight. "You can get some coffee as soon as you hit Highway 42, there's a gas station right there," she tells this bleary-eyed reporter, preparing to depart. "And, watch for the deer on the way out!"

MISSOURI resources

Fall 2001 • Volume 18 • Number 3

The **4Rs** of Reeds Spring High School

by Philip Tremblay
photographs by Scott Myers

The following articles have been written by Reeds Spring High School journalism students who have watched the idea of a school-based composting and recycling project grow into a national success story.

High school science teacher Mike Collins believes his students learn more when they are involved. When the students learned several years ago that a regional composting site might be constructed a short distance from their new school, Collins encouraged them to study the situation and then react.

"We don't develop environmental activists here," Collins recently said. "We develop environmentalists who take action."

Today, the school district in Stone County has developed an extensive recycling effort that features a state-of-the-art in-vessel composting system. The district's five school buildings are now working on recovery of 96 percent of their waste generation for recycling and composting. According to Ed Boyd of Wright Environmental



Reeds Spring High School science teacher Mike Collins (right) shows visitors around the school's greenhouse. School-generated waste is composted and then used to nourish the soil for plant growth.

Management, Inc., the Canadian manufacturer of the composting equipment, this effort was the first of its kind for a high school in the United States.

The students not only provide the school spirit that drives the waste collection, they helped research the feasibility of the project and write the funding application that earned a \$100,000 Missouri Department of Natural Resources grant to purchase the composter. Collins reports that even after they graduate, students write to him asking how "their" project is doing.

As part of the project's ongoing public relations outreach, the following articles tell how current students view their project.

R Project Means Recycle, Reduce, Reuse and Respect

by Elisha Wellman

The R Project was created by students so that Reeds Spring High School could start recycling waste that the school usually throws away. The "R" stands for Recycle, Reduce, Reuse, Respect and, of course, Reeds Spring.

Mike Collins, science teacher and local environmental advocate, and his students started the R Project in 1995. "In 1997, we wrote an application for a Missouri Department of Natural Resources grant of \$100,000, and we began recycling. In 1999, the grant was approved, and that fall, the construction of the Recycling Center began. In 2000, we began composting school wastes," said Collins.

The project was financed 75 percent by a Department of Natural Resources, Solid Waste Management Program grant and 25 percent by the Reeds Spring School District. The total cost was \$135,000.

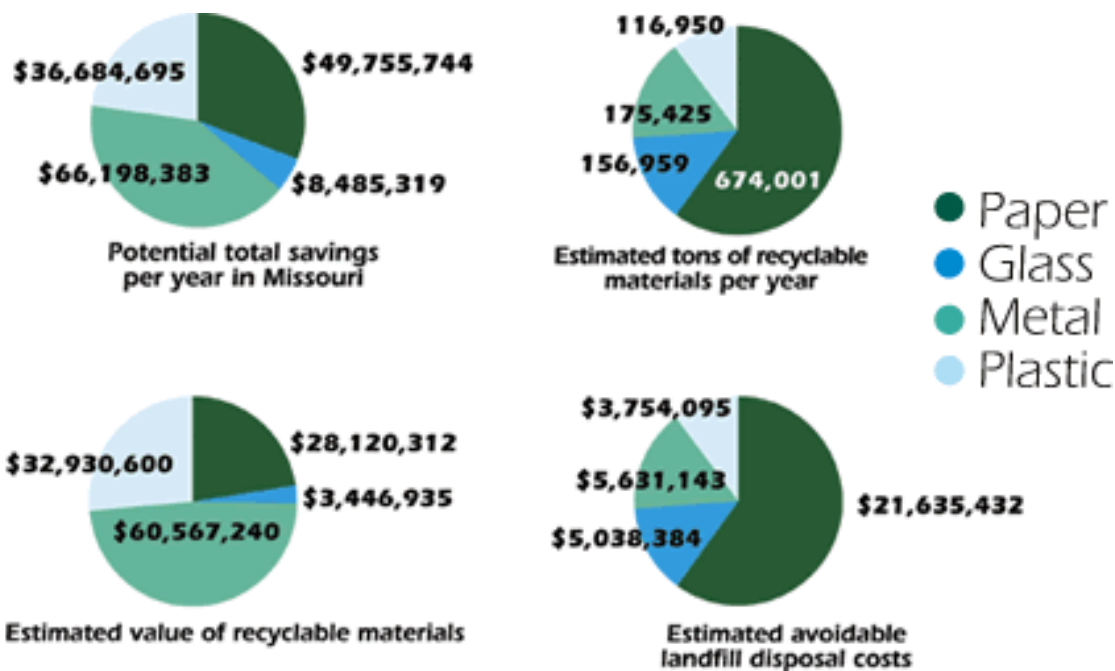
The R Project came about as Collins and his students looked for an alternative to putting the school's waste in landfills. The students researched composting and located the Wright Environmental Management Inc. 750 (W.E.M.I. 750), a Canadian-developed, in-vessel composting system.

The W.E.M.I. 750 does not smell like a landfill because its bio-filter and operations system controls moisture, temperature and odor. The school-generated waste going into the system consists of organics such as cafeteria food scraps, paper, cardboard, leaves and grass trimmings.

The W.E.M.I.
750 is an 8-
foot-wide by
11-foot-tall,
mean, green

machine that measures 30 feet long. The process takes a recipe of paper, cardboard and organics, slowly churning them on trays pushed by a slow-moving hydraulic ram. The compost goes through 28 days of processing under automatic air and moisture

inputs and then sits for seven days to cure and dry. After the drying period, the compost is bagged and sold in 40-pound bags or in bulk.



The pie chart data are taken from a two-year study of Missouri's Municipal Solid Waste Stream by the Midwest Assistance Program and compiled by students Amber Foster and Rachel Stallman. Values represent 1997 data.

Collins thought the technology of the W.E.M.I. 750 was well-suited to protect the nearby Table Rock Lake area environment from odors and surface water contamination. The environmentally friendly R Project is expected to positively impact the community. The process includes a leachate recirculation system for all liquid used in the composting, eliminating runoff that could pollute the nearby lake or groundwater.

Teachers at the high school also have volunteered to help with the recycling effort. Tonya Lewis, chair of the science department, developed a corresponding curriculum for geology, chemistry, and physics classes. Collins developed a curriculum for biology and botany classes. Mary Ogden's English classes created brochures and a logo for the project.

Other educational teams that were involved in the development of the R Project were Deborah Davila's Journalism II class, the group that also does the "Wolfcall" high school annual, the Media Center, mathematics classes, computer-aided drafting classes, art and design classes and the Tri-Lakes Community Resource Center.

Student Involvement Helps R Project Attain Goals

by Cosey Lehman

The R Project began as one student's idea. It has since grown to involve students in nearly every high school subject area. Classes that are involved include biology, calculus and even journalism, where public relations support for the project is addressed. Students who have written these articles have been personally involved in the project. They know the long-term benefits of the process and have been more than willing to help improve the community and the local environment.

Ryan Van Fossen, a junior, explains those benefits: "The R Project is very environmentally friendly. Instead of just dumping waste into landfills, it is being used in beneficial ways," said Van Fossen.

All students are given the opportunity to participate in at least some way. For those who have not worked on the project directly or in a classroom, recycling bins have been set up in the lunchroom. These are used to separate materials that can be composted from those that cannot.



Bags of shredded paper will be placed in the in-vessel composting system at Reeds Spring High School. To the left of the bags is a cardboard compactor.

For some students, the knowledge they have gained from the R Project has made them want to continue to recycle outside of school. "I separate trash at lunch and then at home, too. I am going to propose recycling at my work if they haven't already been asked about it," said junior Amber Davis. Joe White, another junior, also recycles every chance he gets. Both students are in the second hour "recycling class" that collects paper from the recycling bins in each classroom, separates the trash generated at the cafeteria, and hauls the trash to the recycling building.

Students' reactions are overwhelmingly positive toward the R Project. "I believe the process is worthwhile. There are so many positive things that can come from it that I think every school should have a similar recycling effort," said Lance Dombrowski, a junior.

A team has even been put together to deal with public relations. They attend state and national conferences and give informative presentations about the R Project. "I am grateful for the experience I have gained on the public relations team. I'm also really glad that I get to tell so many people about the project and how beneficial it is," said Haley Smith, a junior.

Many Reeds Spring students are excited about the idea of "garbage scholarships."

Money for these scholarships comes from the profits made by selling the end marketable product – the finished compost. "I think the garbage scholarships are a great way for the R Project to give as well as receive," said senior Crystal Burgert.

Adam Bale, a junior, put a different twist on the scholarships, "They are a neat gift from trash," Bale said.

For students who do not receive scholarships, there still are benefits to reap. Not only do they become more aware of the local environment, the R Project builds foundations for a cleaner environment, one student at a time.

Missouri's Own On-Site Composting Demonstration

by Jaime Perkins

In 1995, science teacher and environmental advocate Mike Collins was one of the first to recognize the problem of excess solid waste generation, something that everyone should be concerned about. The high school had done its part to recycle for several years, with a little help from Collins's second hour biology class.

Blue bins are in every classroom in the high school. Every Monday during second hour, the biology students came around to collect paper waste. But it wasn't enough waste reduction. Then, a student looking on the Internet for information about in-vessel composting showed his findings to Collins, and the R Project was born.

The most important characteristic of the R Project is that it is student-operated, student-based and student-oriented. It is a recycling project that has already saved the school district \$62,000. The results are truly amazing.

The new composting system is capable of doing impressive work. Students now collect waste from the classrooms and lunchroom, dump it in the composter and 28 days later, fresh compost is removed. The compost is then used around plants and trees in the high school greenhouse a few yards away. Reeds Spring students are not the only tree-growers who will use this compost. Contracts have been made with area businesses and local nurseries to help sell the compost. This means not only does the in-vessel composting system save the school district money, it also makes money. Many people are in awe of what Collins's students have been able to accomplish.

But it is not just Collins's classes that are responsible. The entire student body does its share of recycling. Reeds Spring used to recycle only paper and cardboard waste. Now we recycle 45 percent of the food waste as well. Recycling bins are set up in the lunchroom so students can be a part of this effort. Decorated signs show students where to put waste.

The "Joe Factor" is part of the recycling process in the high school lunchroom. Junior

Joe White, a brawny football player, has stood next to the bins to make sure students learned how to recycle the waste from their trays.

"The bins were my idea," said White with a grin. "I'm not embarrassed to stand in front of the lunchroom because it's for a good cause. I don't care what people think," he added.

Collins was once told he would be lucky to have a 75 percent recycling rate from the lunchroom bins, but this was not to be. With a starting rate of around 70 percent, Collins knew we had landed on a gold mine. Within a few weeks, that figure had risen to a staggering 96 percent recycling rate. This means we recycle 96 percent of the trash we produce, and that is a lot.

"I was pumped by the starting rate. It gave me motivation to strive for a better percentage," said White.

Figures show that for the 2,032 people in the high school, each person produces 1.5 tons of trash per school year. That adds up to 3,048 tons of trash that was formerly going to landfills. Now, with the R Project in full swing, we recycle 2,928 tons of that waste.



The late Gov. Mel Carnahan supported these types of educational programs in Missouri. What gets the most attention now is perhaps the fact that ours is the only high school in Missouri, and first in the nation, with such a recycling program.

We hope we have started a chain reaction. If other schools start recycling and are lucky enough to have the response we did, this world could be a much cleaner, better place, and even sooner than we thought.

The motivation and positive attitudes displayed by all people involved in the project have proved contagious. The vocational-technical school has also caught recycling fever. Printing teacher Bob Bruffett has realized how much paper is wasted daily in his class. "The numbers are impressive," he said.

Many of the students who are in his class are also in Collins's second-hour class. They

do what they can to encourage recycling. Senior Aaron Blankenship is one of those dedicated students.

"I'm glad we convinced other teachers to recycle at the vo-tech," Blankenship said. "We use so much paper in printing class that we started bringing the waste paper over to Collins for the recycling project," he explained.

Seeing the composting and recycling collections demonstrated here, there may be other schools that will take the initiative to get a recycling project started. You have no idea how much you can save until you actually start doing the work.

For further information on composting and recycling in Missouri, contact the Department of Natural Resources by calling 800-361-4827, (573) 751-5401 or by visiting the department's solid waste Web site at [www.dnr.state.mo.us/alpd/swmp/homeswmp.htm].

Philip Tremblay is a public information specialist with the department's Solid Waste Management Program, within the [Division of Environmental Quality](#).

Tremblay worked with the students to compile the stories, graphics and data contained in this report.

Resource Honor Roll



Mike Collins

When a regional composting facility was planned for an area a few hundred yards from the new Reeds Spring High School, Mike Collins, a biology and botany teacher, challenged his students to investigate the situation and suggest alternatives for handling the area's growing waste.

Using the Internet and Tri-Lakes Community Resource Center, Collins's young scientists studied composting and alternative means of solid-waste disposal. They also attended public hearings about the proposed facility and visited similar facilities in Texas.

Their research concluded that a large, regional composting facility would produce odors and potential environmental damage to nearby Table Rock Lake. The students recommended as an alternative, on-site composting at some of the area businesses.

Not content to simply raise public awareness about the proposed composting site, Collins and his students demonstrated how waste reduction, recycling and composting at the school could save the school district money and fund scholarships.

The accomplishments of Collins and his students are described in the article, ["The Four Rs of Reeds Spring High School"](#) of this issue of *Missouri Resources*. Their innovative composting equipment and recycling philosophy have earned a number of awards and recognition. For his leadership, Collins received the Missouri Waste Control Coalition's Outstanding Achievement Award for Education.

The James River Basin Partnership began in 1997 as a grassroots organization whose members were concerned about area water quality in southwest Missouri's Table Rock Lake area. Since its founding, the partnership's roster has grown to include 160 paid



Diane Sheridan

memberships and a mailing list of 1,500 people.

Executive Director Diana Sheridan was hired in July 2000. Sheridan first developed an interest in water quality in the mid-1970s at her family's cabin on the James River arm of Table Rock Lake. Under her direction, the partnership has drafted a strategic plan that calls for implementing a water-quality evaluation protocol for the river and its tributaries, developed programs to positively impact water quality, increased citizen participation, and developed sustainable funding sources.

To achieve its goals, the partnership works with business and civic organizations, state agencies, the media, educators and residents. Volunteers have organized a Clean Water Cruise, Lawn Care Demonstration Days and Clean Water Kids, a popular program offered at area schools.

A James River Rescue event included a public awareness campaign, fund-raiser and litter cleanup. During two Table Rock Lake cleanups, volunteers removed tires, trash and flotation foam. In response to increasing eutrophication in Table Rock Lake, the partnership assisted with a study of nonpoint phosphorus export from the basin's 932,000-acre land area. The partnership also administers a program, funded by a National Fish and Wildlife Service grant, which developed a biological index that will help determine the health of area streams.

The partnership assisted in the White River Basin Water Quality forums held at Branson and Mountain Home, Ark. Those forums resulted in officials from Arkansas and Missouri signing a Memorandum of Agreement to protect the basin's water quality. For more information, see ["The White River Basin: Sharing the Resource Means Sharing the Protection,"](#) of this issue.



Resources to Explore

Iliniwek Village STATE HISTORIC SITE

by Larry Grantham



On May 17, 1673, Louis Jolliet and Father Jacques Marquette, with five voyageurs, set out in two canoes from the mission of St. Ignace in present-day

Michigan. They were intent on exploring the Mississippi River to determine where it flowed. What they found eventually would be recognized as [Iliniwek Village State Historic Site](#) because of its significance.



Marquette had been in charge of the mission at Chequemagon on Lake Superior, in Wisconsin, and had encountered the Illinois Indians there. He had heard of the large river flowing through the land's interior and that the Illinois lived along its banks. While Jolliet was intent on exploration, Marquette was intent on founding a mission among the Illinois. They paddled along the northern edge of Lake Michigan, entered Green Bay, and continued up the Fox River to what is today Portage, Wis. With the

help of some Indians, they carried their canoes into the Wisconsin River. One month later, they entered the Mighty Mississippi.

After following the river for some distance without encountering any American Indians, on June 25, 1673, they noticed their first evidence of other people in the form of a beaten path leading from the river. They resolved to go and see if the path led to a village. What they saw amazed them. This village, divided into three parts, had perhaps 300 lodges, and Marquette estimated that there were 8,000 people in the village. They were Illinois Indians, and the village was called "Peoria." More than one-half of the account left by Marquette dealt with this village, which would become the Illiniwek Village State Historic Site, and the Illinois in general.

Following the Jolliet-Marquette expedition of 1673, Marquette was anxious to return to found a mission among the Illinois. In the spring of 1675, he went to another Illinois village near Starved Rock, Ill. and founded the mission of the Immaculate Conception. He spent only a short time there due to illness and was returning north when he died along the shore of Lake Michigan. Father Claude Allouez returned to this village in 1677 and carried on the missionary activities. Allouez noted that a large number of Illinois had come to that place, and it seems probable that most of the people from the village in the vicinity of the Mississippi River that Marquette and Jolliet encountered had migrated there. In 1682-1683, Robert Cavalier, Sieur de La Salle built Fort St. Louis on top of Starved Rock following his trip to the mouth of the Mississippi. At this time, most of the Illinois moved there, abandoning other sites.

This village that Jolliet and Marquette encountered was forgotten for nearly two centuries. When John Gilmary Shea published the Marquette account in 1856, speculation about the location of the village began, but no firm evidence was forthcoming. While many people thought that the site might be located in Missouri, an article published in 1903 swayed most subsequent authors into believing that the Marquette landing and the village were located in Iowa at the mouth of the Iowa River.



A student from the University of Illinois Field School carefully excavates a storage pit used by American Indians at the Illiniwek Village State Historic Site. DNR photo by George Kastler

Finally, in 1984, as the result of a county waterline project, a site was located on the Des Moines River in Clark County, Mo., that appeared to fit the description in the Marquette account and had the appropriate kinds of materials one might expect from an Illinois village. As there is not a site at the mouth of the Iowa River, it appears that this village site on the Des Moines River is the one visited by the Jolliet-Marquette expedition. The Missouri Department of Natural Resources, realizing the

significance of the site, acquired the property in 1992. The site was named Illiniwek

Village State Historic Site because "Iliniwek" is the term the Illinois used for themselves and means "the people." To date, it is the only known location of an Illinois Indian village site found in Missouri.

The Illinois were one of the three most significant Indian groups occupying Missouri at the time of first European contact. The Illinois were latecomers to this area, probably displaced from the eastern Great Lakes by the beginning of the Iroquois wars (circa 1640). They had taken over the area from the southern end of Lake Michigan to the Mississippi and south almost to the Arkansas River.

The Illinois were composed of as many as 12 subtribes, of which the Peoria was the largest. Other groups included the Kaskaskia, Cahokia, Tamaroa, Mitchigamea and the Coricointenon. The Illinois were Central Algonkian speakers. Other Central Algonkian speakers (Sac, Fox, Kickapoo, Pottawatomie, and Mascouten) appear to have moved out of the Michigan area and across Lake Michigan to the area of Green Bay, Wis., about the same time the Illinois entered the area. These movements and warfare were the result of Europeans settling along the East Coast and putting pressure on groups farther to the west.

Unlike earlier groups, archaeologists know a great deal about the Illinois through historical sources. Several Europeans visited the Illinois and left accounts of how they lived. The Illinois were village agriculturists. They lived in large villages, consisting of longhouses, which contained extended families, small oval houses for single families, and round houses. They grew corn, beans and squash as well as some local plants in garden plots around the village. They also hunted a wide variety of animals to supplement a diet of domesticated crops and plants they gathered.

They did not live in these large villages all year. The number of people in the village could not be maintained without moving often as they depleted the animal populations in the area. A seasonal round took them from place to place within their territory throughout the seasons. In March or April, they came back to their village to plant crops and remained there until the plants were up.

In the summer, they went on an extended hunt looking principally for bison. They returned from the hunt, usually in August, to harvest the crops and remained in the village until winter. With the coming of winter, the village broke up into small groups and went to winter villages. This was a hard time to generate food through hunting and small villages spread across the territory made it easier to get animals.

While a great deal is known about the Illinois from historical sources, very little was known about the Illinois from archaeology. Excavations had been conducted on several Illinois sites in the state of Illinois, but the complex nature of some and the lack of ceramics at the later sites left many questions unanswered. Additionally, evidence of houses in those excavations had been extremely limited.

Excavations at Iliniwek Village State

Historic Site began in 1993. Since that time, excavations have been conducted on two different types of longhouses, a small oval house, portions of a circular house, as well as the ditch and palisade on the western side of the site. The good preservation of materials, relatively simple nature of the deposits, and presence of house patterns makes Iliniwek probably the most significant of all the Illinois sites.



A collection of arrow points was discovered at the site. DNR photo by Larry Grantham

The excavations at Iliniwek Village State Historic Site have added greatly to our understanding of the Illinois and how they lived. Analysis of charred plant remains helps us determine what kind of domesticated and wild plants they ate, and analysis of bones helps us determine the kinds of animals they used as food. Other kinds of studies help archaeologists determine how these people interacted with other groups of Illinois, as well as other Siouan groups in the area. While historians already have learned a great deal from these important excavations, the site has the potential to yield additional information.

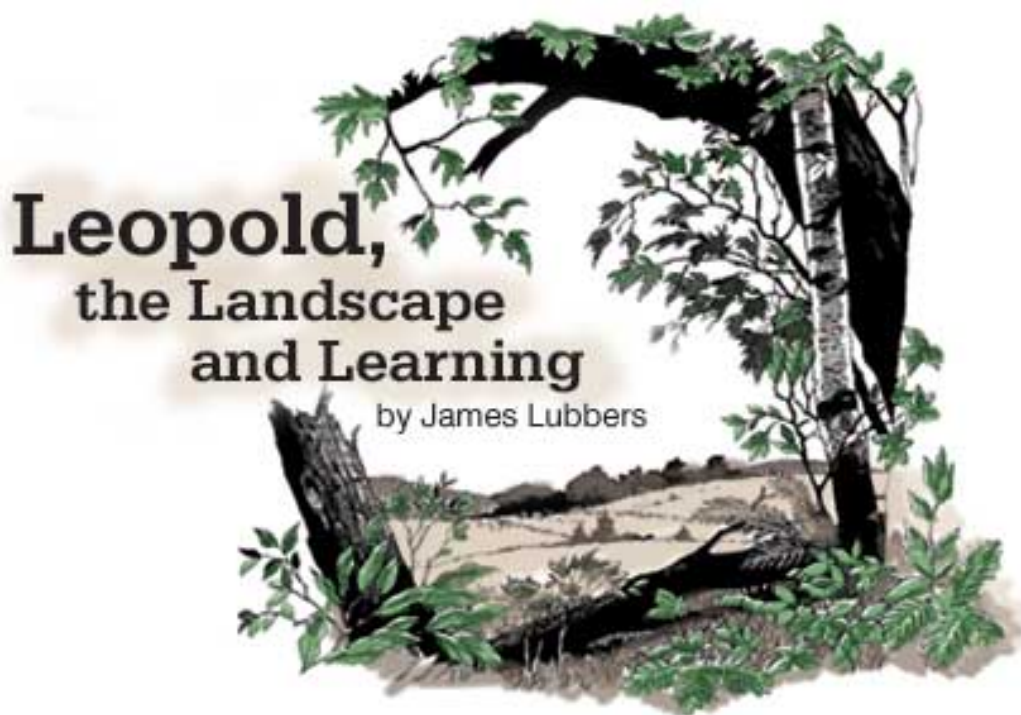
Although research will continue at the site and on its artifacts, visitors today can visit the home of these once-mighty people. Iliniwek Village State Historic Site is approximately two miles south of St. Francoisville on a gravel road off Route B in Clark County. The historic site has an information kiosk with exhibits about the Illinois and the site. A short, accessible walking trail will take visitors through the area, where an outline of a longhouse shows where the Illinois once lived. The area also includes picnic tables. Additional trails, restrooms and public water will be available in the near future.

For more information, call the [Department of Natural Resources](#) toll free at 1-800-334-6946 (voice) or 1-800-379-2419 (Telecommunications Device for the Deaf).

Larry Grantham is an archaeologist with the department's [Division of State Parks](#).



Teacher's Notebook



**"The objective is to teach the student to see the land,
to understand what he sees, and enjoy what he understands ... "**

– Aldo Leopold, 1942

Aldo Leopold (1887-1948) is perhaps most widely recognized for "A Sand County Almanac," a collection of essays about his observations of wildlife and the natural environment in the sand counties of Wisconsin. In a survey of environmental educators (The American Nature Study Society, 1991) this little book ranked number four among the 10 most significant environmental events of the 20th century, after "Silent Spring" by Rachel Carson, Earth Day 1970, and the National Environmental Protection Act.

Now, more than 50 years after his death, Aldo Leopold's legacy of "reading the landscape" and calling for a "land ethic" continues to inspire new generations through the activities and lessons developed for the Leopold Education Project.

The opening quote by Leopold is from a wildlife ecology course he taught during his years as a professor of game management at the University of Wisconsin at Madison. This philosophy is the heart and soul of the Leopold Education Project (LEP). The LEP is designed for students in grades six and up. It is an interdisciplinary program that uses hands-on and minds-on activities to help students think critically about how humans relate to the natural world, and to help them develop their own personal land ethic.

Originated in 1991, the LEP curriculum was revised to its present form by Pheasants Forever, the conservation group that purchased it in 1995. Since then, more than 200 educator in-service and facilitator workshops have been held in 30 states, training about 4,000 educators, roughly a third of whom became facilitators so they could provide the training to others. By attending a one-day workshop, educators receive a 21-lesson teachers guide, task cards, a copy of "A Sand County Almanac" and gain access to other supporting materials. Visit [www.lep.org] or call toll free 877-773-2070 for more information about the Leopold Education Project.

The LEP in Missouri

The first LEP facilitator training in Missouri was held in 1997. Southwest Missouri State University became the official state sponsor in May 1998. Janice Greene, a professor in the university's biology department, coordinates the LEP network throughout Missouri. There are 68 facilitators in 25 counties and more than 300 educators – formal and nonformal – across the state who have been through the LEP training.

Missouri has a long and strong history of conservation and environmental education and the idea of developing a land ethic is not really new. What is new is that the LEP has renewed and validated our efforts to avoid or fix many of the environmental problems that Leopold described in the 1930s and 1940s. Another popular quote by Leopold looks beyond the economics of human behavior:

"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise," he noted in "A Sand County Almanac."

LEP Objectives and the Show-Me Standards

By its interdisciplinary nature, the LEP meets many of the knowledge and performance criteria in the Missouri Show-Me Standards. There are four principal objectives of the Leopold Education Project:

1. To instill in students, through direct experience, an appreciation and respect for the natural world so they may develop a positive relationship with the land.
2. To advance students' scientific understanding of the land community's natural processes so that they may make informed decisions about conservation and other land-use issues.
3. To advance students' creative-thinking skills through the hands-on and minds-on activities found in the teachers guide.
4. To introduce students to literary works of writers in the conservation community to create an interest in further exploration and demonstrate the melding of science and literature.

Leopold viewed all knowledge as being interrelated. Through the LEP materials, a truly integrated curriculum can be taught using these basic ideas as both a foundation and a springboard for further learning. The following activities provide examples of experiences students have.



"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise."

– Aldo Leopold
in "A Sand County Almanac"

Reading the Landscape

Leopold often practiced what he called "reading the landscape," a skill that requires keen observation and seeing the land as a whole. He asked students to go beyond only identification and encouraged them to seek out relationships between the land, its inhabitants and time. A student's observations lead to questions, the answers to which may not be that obvious. But, by thinking through how the evidence leads to the questions, and asking the right questions, the student may learn something more important than the answers. Here are two LEP approaches to help your students read the landscape.

Approach 1:

(This exercise requires reading "A Sand County Almanac.")

Select several quotes from "A Sand County Almanac" and present them as examples of

Leopold's talent for reading the landscape.

Ask students to select one of the quotes and explain what they think Leopold had in mind. Ask students why they chose that particular quote – what does it mean to them?

Approach 2:

(This exercise is suitable for individual or group responses.)

Have students cut out a tag or use a 3-inch-by-5-inch card and attach a string to it. Let the students go outside to an area where they can be inspired to ask a read-the-landscape-type question (e.g., questions that lead to understanding what they observe). They should write the question on the tag and attach it to the object that inspired the question, such as an unusual tree or evidence of the presence of wildlife.

Students should report back to the teacher and, as a group, return to each of the tags and discuss potential explanations for their queries.

NOTE: In both approaches, do not rush an answer (in true Leopoldian fashion) – allow ample time for the students to discover the answer for themselves or to figure out how they could arrive at such an answer.

LEP Task Cards

Teachers also may receive a set of task cards when they attend one of the LEP training workshops. Small groups of students are issued a card that poses a problem for them to address.

For Example:

- Locate an area that would best protect a small bird during a winter ice storm.
- In a grassy field, find and trace some runways made by mice and moles.
- List as many ways as you can come up with to prove that the wind is present.

But First, Your Own Land Ethic

Remember that Leopold was thinking ecologically back in the 1930s and 1940s! Today, ecology is a common topic, but we still have a long way to go to put into practice the kinds of ideals so beautifully demonstrated by Leopold's notion of a "land ethic." Please consider reading "A Sand County Almanac" and consider making it available for your students' enjoyment as well.

To learn more about the Leopold Education Project, to find out when and where the workshops are, or to set up a LEP workshop, contact Janice Greene at Southwest Missouri State University in Springfield at (417) 836-5306 or jsg326f@smsu.edu.

You also may call the Department of Natural Resources' [Environmental Education Unit](#) at 800-361-4827 or send an e-mail to the author at nrlubbj@mail.dnr.state.mo.us.

Jim Lubbers is an environmental education specialist with the department's [Technical](#)

[Assistance Program within the Division of Environmental Quality](#)



The Missouri-Kansas-Texas (MKT) Railroad dates back to 1865 as the Union Pacific Railway Co.'s Southern Branch. It was renamed in 1870 and the first section was



built running from Fort Scott, Kan. to Sedalia. Eventually, the line ran from Sedalia to Machens, north of St. Charles. The company laid much of its track in the flat areas of the Missouri River floodplain.



The only tunnel along the corridor of the former MKT still stands near Rocheport. It was completed in 1893, approximately seven years before this photograph was taken. Katy Trail State Park, a 225-mile hiking and bicycling path follows the path of the MKT. It is the longest developed rails-to-trails project in the nation. Trail users can still pass through the 243-foot-long stone arched tunnel as they follow the trail between the river and towering bluffs. The State Historical Society of Missouri supplied this image.

Send your photo to "Time Exposures," c/o [Missouri Resources](#), P.O. Box 176, Jefferson City, MO 65102-0176. All pictures will be returned via insured mail. Pre-1970 environmental and natural resource photos from Missouri will be considered. Please try to include the time and location of the picture, a brief description and any related historic details that might be of interest to our readers.

Battling the **BIG CHILL**

Weatherization Program Celebrates 25th Year

by Kerry Cordray
photographs by Scott Myers



Skip Sears of Missouri Ozarks Community Action (MOCA) uses a blower door and fan to detect air leaks in a house being weatherized.

The furnace ran constantly. The house was still chilly most of the time. The winter bills had always been hard to manage on a fixed income, but when Shirley Reese opened her December 2000 gas bill, she decided it was time to look for some kind of help.

"I didn't know how I would be able to pay a \$600 heating bill," said Reese, a resident of Pine Lawn, in St. Louis County. "I heard about a program where I could get insulation for my home." She decided to check it out.

The program Reese checked out was the Low Income [Weatherization Assistance Program](#), administered in Missouri by the Department of Natural Resources' [Energy Center](#) and known simply to many grateful Missourians by the one-word name, "Weatherization." 2001 marks the 25th anniversary of the Weatherization Program, and during those 25 years more than 138,000 homes have been weatherized statewide.

Funded by the U.S. Department of Energy and the State of Missouri, the

program is carried out by staff from 18 local agencies throughout the state. The work they do makes the homes of qualifying Missourians more energy efficient and comfortable, reducing energy use and utility bills and directly meeting many health and safety needs.

"For low-income families, weatherization provides long-term solutions to rising energy problems," said Anita Randolph, Energy Center director. "After a home is weatherized, a Missourian heating his or her home may save as much as one-third of the energy needed to heat the home, from the moment improvements are made and for years to come. This means hundreds of dollars are put back into the resident's pocket to buy groceries, visit a doctor, buy medicine or improve some standard of living. Weatherization is widely acknowledged to be one of the biggest successes among government programs initiated in the last 25 years."

Helping Those Who Need it Most

Reese applied to Services Toward Empowering People (STEP), a St. Louis-area organization that is one of the agencies involved in providing Missouri's weatherization services (see map on page 14). Applications are assessed for eligibility based on the income guidelines of the program and other factors. "Weatherization specifically focuses on assisting those with low income, primarily the elderly, persons with disabilities and families with children," said Ron Wyse, director of the program for the Energy Center.

"Work may include reducing air leakage, adding insulation, repairing or replacing heating systems, minor repairs and health and safety measures," said Wyse. After work is completed, qualified inspectors check the work to make sure that quality standards are met. Projects may be done in single-family homes, multifamily dwellings and mobile homes.

Colder-than-normal temperatures and higher heating costs last winter were a burden for many Missourians, especially those with low incomes. "Folks were hurting," said Bob Jackson, weatherization director of the Kansas City Department of Housing and Human Development. "The media was full of outraged gas customers. Heating crisis meetings were convened by the Public Service Commission and members of the city council. With natural gas and propane prices going through the roof, people who never would have needed help before were turning up every day. Our weatherization applications quadrupled compared to last year."



David Miller, MOCA weatherization director, finds the house's rusty old furnace inefficient and potentially dangerous.

In response, the department's Energy Center and local agencies sought and received federal approval for several changes to the Weatherization Program. These included raising income eligibility from 125 percent to 150 percent of the federal poverty guidelines, increasing the amount of spending per home, and extending the program year to complete work on homes that needed an emergency furnace repair or replacement.

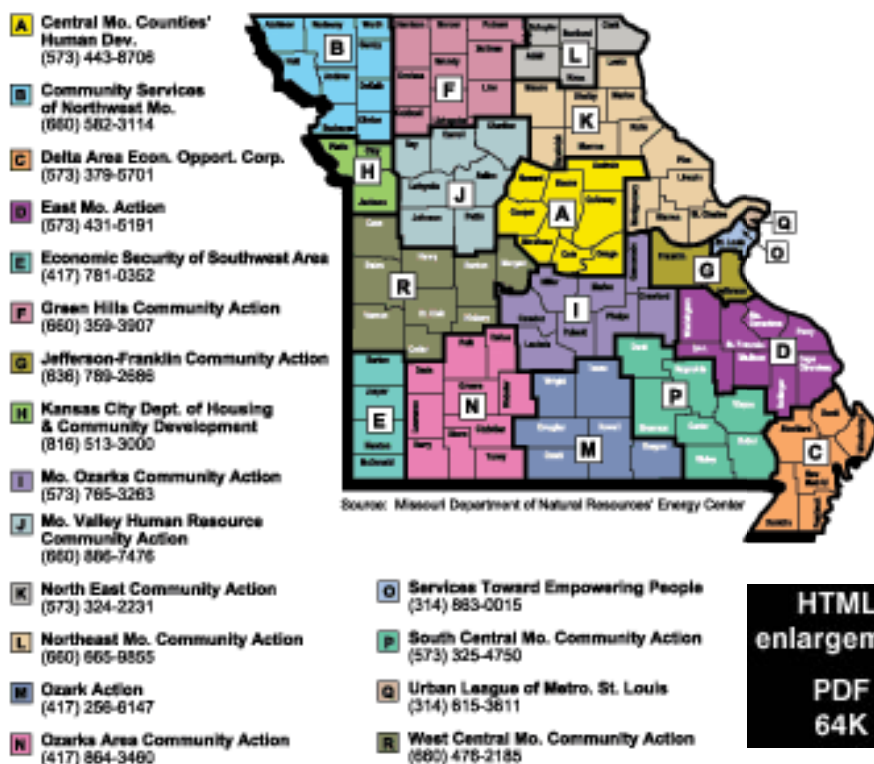
For those needing the most help, the changes were positive news. "With last year's high heating costs, clients receiving weatherization assistance were able to immediately see the benefits in dollars saved by a reduction in their utility usage," said David Miller, weatherization director of Missouri Ozarks Community Action Inc. in Richland. Low-income citizens pay a higher percentage of their income for energy costs, resulting in higher "heating burdens." The percent of income spent on residential energy increases as fuel costs rise, and this is especially difficult for those on a fixed income. Low-income households spend approximately 14 percent of their income on energy needs, compared to 4 percent by other households.

Launched in 1976 as a pilot program of the U.S. Department of Energy, the Weatherization Assistance Program initially emphasized emergency and temporary measures, including caulking and weather stripping of windows and doors and low-cost measures such as covering windows with plastic sheets. "The program was pretty low-tech in those days," said department Energy Specialist Ted Koenig. "By the early 1980s, the program was moving to more permanent and cost-effective measures – improving the efficiency of existing space heating and water-heating systems. In 1985, spending for the replacement of defective furnaces and boilers was approved."

In the 1990s, the trend toward a more sophisticated program based on cost-effective measures continued with the adoption of computerized energy audits and improved training. "Weatherization now truly pushes the envelope of the technology for home energy efficiency," said Terry Sanders, weatherization director for Ozarks Action, Inc. in West Plains.

Diagnostic equipment is used to detect air leaks and pressure imbalances. Crews test the home heating system and gas appliances for carbon monoxide, an odorless, colorless gas that can be deadly, even in low concentrations. "Every dollar spent on weatherization returns \$1.80 in energy-related benefits," said department Energy Specialist Bonnie Higdon. "But that doesn't even begin to count the value of taking better

Low-Income Weatherization Assistance Program Service Areas



HTML
enlargement
PDF
64K

care of our elderly or the lives saved by discovering health and safety hazards like gas leaks, fire hazards and carbon monoxide." Weatherization also benefits the environment, cutting the consumption of foreign oil and reducing air pollution emissions. Weatherization reduces carbon dioxide emissions by an average of one ton per year for each weatherized home, according to information from the U.S. Department of Energy.

Shirley Reese's house in Pine Lawn was weatherized in March, 2001, one of 1,966 homes weatherized during

the last fiscal year in Missouri. However, there is no danger that the work will end anytime soon. Missouri has nearly 450,000 more eligible households. "At current rates of federal funding, it would take 150 years to weatherize all eligible Missouri homes," said Wyse.

There already have been some dramatic results. Nationally, the 5 millionth home will be weatherized in 2001, and as a result of weatherization measures now in place, the U.S. Department of Energy estimates that low-income families avoided \$1 billion in energy costs in 2000 alone. Services are delivered in all 50 states, the District of Columbia and among American Indian tribes through approximately 970 local agencies.

"There are prospects for increased funding for weatherization. Most federal budget proposals for the next fiscal year call for a significant increase for the program," said Wyse. "That would mean a real boost in the number of Missourians we can help."

"I could tell right after the insulation crew finished work that the house was more comfortable," Shirley Reese declared.

"She may not realize fully how much difference has been made until cold weather sets in this fall," said Charles Hines, weatherization director of STEP.

But the true impact of the program probably is best measured by the width of the grin on Reese's face. "I never look forward to cold weather, but I think this winter I may find it a little easier to get by," she beamed. "I've managed to keep my roots down here quite a few years. Looks now like I can afford to stick around a few years more."

Who Qualifies?

Low-income Missouri residents are eligible, especially the elderly, the physically disadvantaged and families with small children. Thirty-four percent of all applicants served by weatherization are elderly.

To be eligible for assistance, a household must be at or below 150 percent of federal poverty guidelines. For example, a family of four can make no more than \$26,475 per year. For specific guidelines, contact the local community action agency that serves your area.

To apply for assistance, please see the map on page 14 and find the community action agency that serves your county. The agency will ask you to complete appropriate forms. Or call the Department of Natural Resources' Energy Center at 1-800-334-6946 or (573) 751-3443.

Benefits for Those Served

- Provides long-term reduction of energy use and utility bills
- Provides homeowners financial savings from the time the improvements are made and for many years into the future
- Improves comfort, health and safety
- Lessens the financial burden of families most in need and helps them pay utility bills promptly
- Reduces the amount of state and federal assistance needed to pay higher utility bills through fuel-assistance programs
- Reduces carbon dioxide emissions by an average of 1 ton per year per weatherized home
- Improves neighborhood housing conditions
- Educates consumers in energy-efficiency practices
- Produces economic benefits by creating jobs and keeping energy dollars in the local economy

The Web address for the Missouri Department of Natural Resources' Energy Center's Weatherization Program is [</energy/weatherization/wx.htm>].

Kerry Cordray is division information officer for the department's [Energy Center](#)



Diagnostic equipment tests the efficiency of a new hot water heater and furnace after the old appliances were replaced as part of the weatherization.



Branson and other communities in the White River Basin have experienced tremendous growth in recent years. A number of new housing developments have sprung up beside the lakes and rivers, such as this golf course community near the banks of Lake Taneycomo.

One of the most beautiful, environmentally diverse and economically dynamic regions in the country sits right in the middle of the Ozarks of Missouri and Arkansas. It is called the Upper White River Basin. All of the land area that drains into a water body is called a watershed, or basin. As watersheds go, this one is ecologically unique, geologically complex and just happens to be inhabited by nearly a million people, with that number growing by the hour. "Maintenance of our quality of life rests with our ability to be good stewards of the resources we have inherited," said Dave Coonrod, presiding commissioner of Greene County, Missouri and board chairman of the James River Basin Partnership.

The Upper White River Basin watershed includes Beaver, Table Rock, Taneycomo, Bull Shoals and Norfolk lakes. These lakes snake across the Missouri and Arkansas state boundaries and receive water from many tributaries in both states. To effectively manage water resources, the entire watershed must be considered. Therefore, the White River Basin water quality in Missouri cannot be addressed without partnering with Arkansas.

Water uses in the White River Basin include recreation, drinking water supply and power generation. Recreational uses such as boating, skiing, fishing and swimming are familiar to everyone living in or visiting the Ozarks. The watershed also is rich in high-quality groundwater.

Unique, Diverse, Threatened

Many of the biological, hydrological, and ecological characteristics of the White River Basin

occur nowhere else on Earth. Chris Barnhart, Professor of Biology in Springfield at Southwest Missouri State University, studies freshwater mollusks unique to the White River Basin.

"So few of us realize just how distinctive and diverse the aquatic life in Ozark rivers really is. The river valleys are incised into bedrock, so that the rivers have been isolated from one another for periods that can be measured only in geologic time. The upland reaches have gravel beds and cool, fast water, very different from rivers in the surrounding lowlands. Even though these rivers connect with one another downstream, the upland reaches of each system have unique species that are adapted to these conditions," Barnhart said.

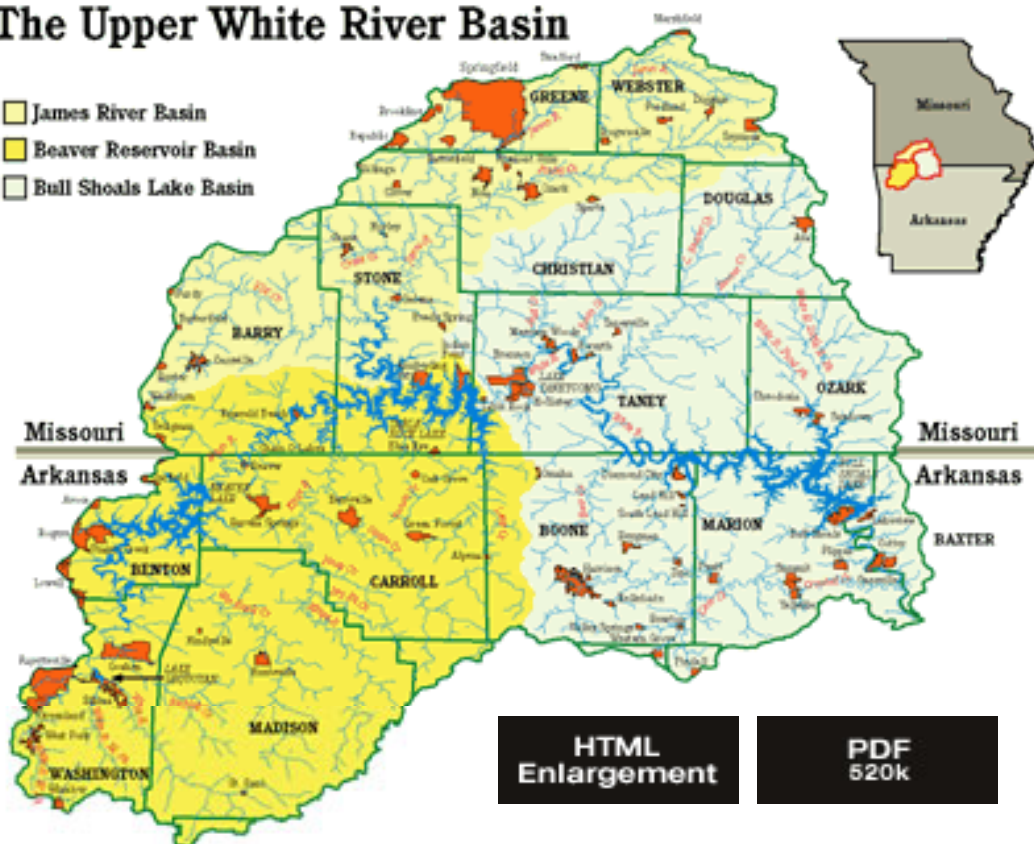
"The White River system, in particular, has several fishes and invertebrates that are found only there. In the James River, for example, we find the dusky stripe shiner, the long fingered crayfish and Pleas' pearly mussel. Go west to the Spring River, or north to the Sac or Gasconade, and different species take their place. Each river in the Ozarks is individual, and the fascinating diversity is absolutely delightful when you become aware of it," Barnhart added.

Success of Local Economy Drives Success of Protection

Those who live in the White River Basin depend on high-quality water resources for

The Upper White River Basin

- James River Basin
- Beaver Reservoir Basin
- Bull Shoals Lake Basin



their livelihood and quality of life in many ways. In Missouri, many people make their living directly from the waters through the tourism industry, such as marina owners, canoe rental operators and resort owners. Others depend on quality water for their everyday lives.

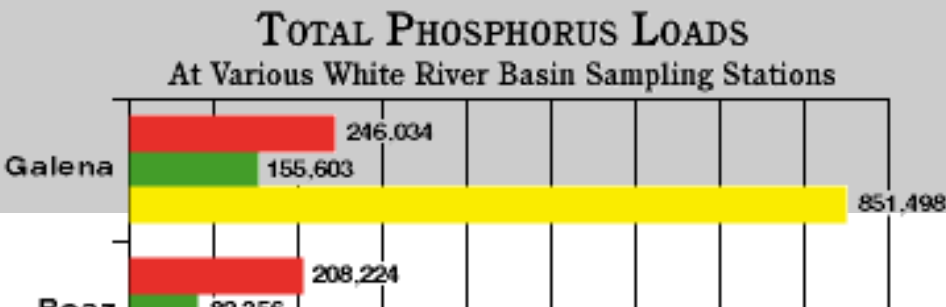
In Arkansas, the economic base of many communities surrounding the Upper White River differ greatly from the economic base in Missouri. In Arkansas, the poultry industry provides jobs and livelihood for many families. The recreation industry also has a different focus. Trout fishing, dependent on cold water with high levels of dissolved oxygen and sufficient flows of water, draws people from all over the country.

Total Maximum Daily Load Approved for James River

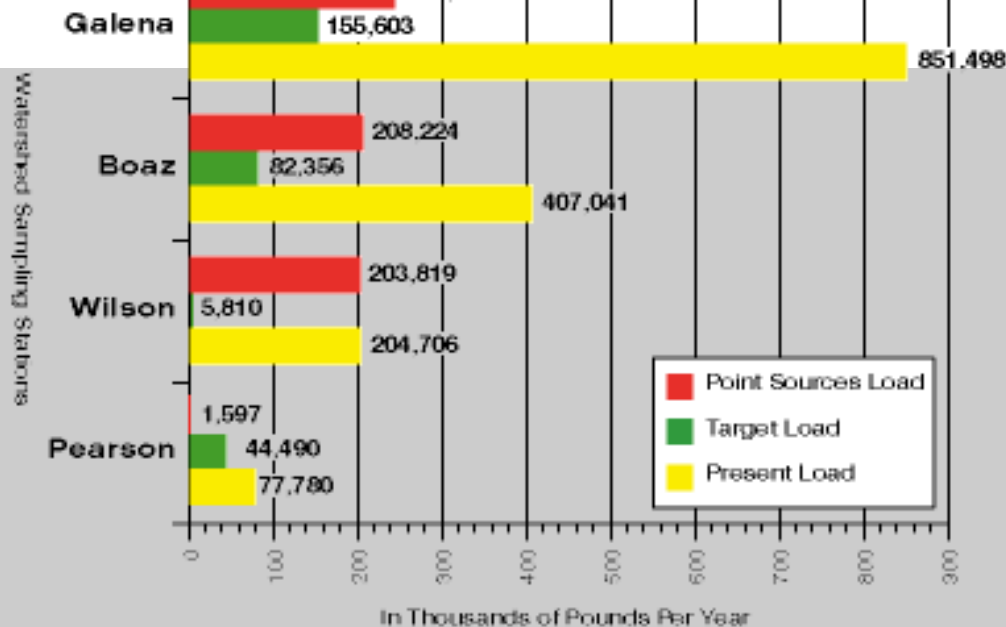
by Sharon Clifford



The U.S. Environmental Protection Agency recently approved [Total Maximum Daily Load \(TMDL\)](#) for the James River. The Department of Natural Resources identifies and develops a plan, referred to as a TMDL, to address the problems for each impaired water body. Nutrients, which can cause excessive algal growth, are the issue of concern in the James River and the James River Arm of Table Rock Lake. Not only can excessive algae be unpleasant for boaters and swimmers, it can lower oxygen to levels that harm many types of aquatic life.



The James River TMDL is significant because it is the first time the department has



developed a plan to address both point and nonpoint sources of pollution in a large watershed. A large reduction in nutrients will be necessary to get the James River back into balance and eliminate the unnatural algal blooms that have

formed on the river in the past several years. The first phase of the plan focuses on permitted facilities and urban storm-water runoff. That emphasis was chosen because procedures existed for addressing point-source concerns. The second phase will focus on nonpoint-source issues and the implementation plan for these sources will be completed in 2004.

The department depends on local watershed groups, such as the James River Basin Partnership, the Watershed Committee of the Ozarks and the Table Rock Lake Water Quality Association, to take a lead promoting public participation in the TMDL process. The department also works with county governments and municipalities to address point-source discharges and stormwater runoff, and to help them develop programs to address septic tank concerns and soil erosion.

Sharon Clifford is an environmental specialist in the department's Water Pollution Control Program. She serves as unit chief for the total maximum daily load section.

While growth and development are becoming leading threats to the health of our waters, it is ironic that this same growth and development also is responsible for much of the success and economic viability that has sustained the area. The increased use and load on this area's water quality and quantity demands diligent protection today, or public and private interests will suffer economic damage from mitigation and regulation costs later.

Soil erosion from construction, a dramatic increase in private septic tanks, increased use of lawn fertilizer and additional storm-water runoff are all tangible and immediate threats to our water resources. Each of these sources of pollution increases the amount of nutrients in rivers and lakes. An excessive increase in nutrients can trigger unsightly algae blooms that stress the biological communities and even cause massive fish kills.

Improperly treated sewage from malfunctioning septic tanks and some small and large sewage treatment plants can create human health hazards in rivers and lakes.

By acting now, financial and human resources can be directed more toward preventing pollution, thus minimizing the work needed to manage cleanups. Trying to clean fouled waters is not only far costlier than keeping them clean, but the returns must be measured in decades rather than months and years.

According to Rosella Hamilton, president of the Table Rock Lake / Kimberling City Area Chamber of Commerce, "Our chamber board recognized the importance of clean water and the economic health of the Table Rock Lake area. Accordingly, the board created the Table Rock Lake Water Quality Inc., a corporation dedicated exclusively to maintaining and improving the waters of Table Rock Lake.

"We have focused our efforts on local septic systems, malfunctioning wastewater treatment plants and hot spots where inadequate or no sewage treatment is in place," Hamilton added.

Cooperative Efforts Actively Protect Water Resources

Managing watersheds and water resources is an extremely complex task. To successfully manage a watershed, the people charged with making decisions must understand its geography, uses, unique characteristics, economy, threats, science and politics. The states of Missouri and Arkansas recognized this and in 1999 initiated a series of meetings called the White River Basin Forums. This was the first step to working collaboratively to understand this complex issue.

Missouri was the host of the first meeting held in Branson on Oct. 27, 1999. At the meeting, a Memorandum of Agreement was signed by the Arkansas Department of Environmental Quality, the Arkansas Soil and Water Conservation Commission and the Missouri Department of Natural Resources. These parties entered an agreement to "enhance and promote cooperative management of water quality in the Upper White River Watershed." In 2000, Arkansas hosted the meeting, focusing on information exchange. The next forum will be held in Springfield in November 2001.

"During this series of meetings, the dedication of the Department of Natural Resources to involving stakeholders and local watershed partnerships has been apparent," said department director Steve Mahfood. "The people whose lives are directly affected have to be committed to successfully manage water resources. To achieve commitment, local citizens must have a thorough understanding of the issues and possible solutions." Mahfood added that local support and understanding is strong and critical to continued success.

Federal support for work in the basin is strong. Recently, U.S. representatives Roy Blunt from Missouri and Asa Hutchinson of Arkansas formed a committee to seek

positive, voluntary projects to enhance the area's water quality. The committee is focusing on the effect of growth in the basin.

The U.S. Army Corps of Engineers is seeking input from both Missouri and Arkansas to clarify the scope for a Comprehensive Plan for the White River Basin.

Bull Shoals Field Station – Southwest Missouri State University



According to John Havel, professor of biology and director of the Bull Shoals Field Station, the Upper White River Basin and its streams and reservoirs are, on the whole, the cleanest surface waters in the state. "However, rapid population growth and tourism industries have led to increasing eutrophication," Havel said. "Elevated concentrations of nutrients, like phosphorus, leads to enhanced growth of algae and depression of dissolved oxygen and water clarity. According to Havel, previous research on lakes Erie and

Washington has shown some of the negative consequences of increasing nutrients on those lakes. Fortunately, water quality usually can be restored simply by reducing the nutrient going into a given body of water.

"We have to be careful in how we interpret changes in reservoirs. Even under natural conditions, these man-made lakes show strong gradients in a variety of characteristics. As an example, recent work by Southwest Missouri State University researchers on Bull Shoals Lake detected large differences in clarity, water chemistry and plankton densities from one end (of the lake) to the next," Havel said.

Researchers at the SMSU Bull Shoals Field Station also have been developing extensive databases on existing literature and other researchers in the Upper White River Basin. For more information about the Bull Shoals Field Station and recent research on water quality, please visit their Web site at [www.bullshoals.smsu.edu].

Partnerships That Work

The James River Basin Partnership and the Missouri Department of Natural Resources are working together to involve the citizens in environmental decisions.

The group worked across county borders in southwest Missouri to deal with water quality issues. In 1999, the partnership facilitated a stakeholder committee to discuss how to reduce the release of phosphorus from wastewater treatment plants. The recommendations were presented to the Missouri Clean Water Commission which adopted a rule change requiring all wastewater treatment facilities in the Table Rock Lake Basin that discharge more than 22,500 gallons per day to decrease the release of phosphorus to new reduced levels by Nov. 30, 2007.

Compliance dates were phased in based on discharge volume. For the city of Springfield, this meant a reduction in the phosphorus released to the James River from approximately 1,000 to 100 pounds per day by Nov. 30, 2003. Springfield met those new release levels in early 2001, nearly three years ahead of schedule.

Missouri State Rep. Judy Berkstresser also formed a committee last year to address lawn fertilizer use in the Table Rock Lake Basin. The group made recommendations to Berkstresser on legislation to limit the amount of phosphorus-containing lawn fertilizer used in Table Rock Basin. The partnership will continue to work with Rep. Berkstresser to address the responsible use of lawn fertilizers through public education efforts.

The partnership's educational campaigns also include programs to educate children about watersheds and good stewardship of those watersheds. In the spring of 2000 and 2001, the James River Basin Partnership worked with the University of Missouri Extension Center and the Hollister School Board to present a Watershed Festival to Taney County fourth-graders. A total of 300 students participated, and more Watershed Festivals are anticipated throughout the White River Basin.

"The most critical job of the James River Basin Partnership is engaging local communities to take part in water quality issues and feel ownership of their resources," said Mahfood. "If each person will make a personal pledge to maintain high water quality in the region, the ultimate goal will be successful."

Diana Sheridan is executive director of the James River Basin Partnership. Sheridan has bachelor's degrees in biology and environmental studies from Drury University in Springfield and master's degrees in both zoology and physiology from the University of Wyoming in Laramie.